

# A REVISION OF THE AUSTRALIAN GENUS *DIEMENIA* SPINOLA (HEMIPTERA: PENTATOMIDAE: PENTATOMINAE)

I. AHMAD & S. KAMALUDDIN

AHMAD, I. & KAMALUDDIN, S. 1989. A revision of the Australian genus *Diemenia* Spinola (Hemiptera: Pentatomidae: Pentatominae) *Rec. S. Aust. Mus.* 23 (1): 21-31.

*Diemenia immarginata* (Dallas) and *D. rubromarginata* (Guérin-Méneville) are redescribed in addition to two new species *grossi* from Mt Buffalo and Mt Hotham, eastern Victoria and *minuta* from New England, Victoria, and from Green Hill Estate, South Australia, with special reference to their metathoracic scent auricles and male and female genitalia. *D. rubromarginata rubromarginata sensu stricto* and *D. rubromarginata deyrollei* Spinola, considered as two different subspecies of *D. rubromarginata* (Guérin-Méneville) by Gross (1976) are synonymised. A cladistic analysis of the taxa in the light of the above characters is also included.

I. Ahmad, Department of Zoology-Entomology, University of Karachi, Karachi-32, Pakistan and S. Kamaluddin, Department of Zoology, Federal Government Urdu Science College, Karachi, Pakistan. Manuscript received 22 January 1988.

Species of *Diemenia* Spinola are Australian in distribution. Gross (1976) speculated that *D. immarginata* (Dallas) might reach New Zealand but we did not find any material from there. Another species, *D. rubromarginata* (Guérin-Méneville), is frequently found as adults and nymphs under eucalyptus bark in the wettest part of South Australia (Gross 1976).

Kirkaldy (1909) catalogued five species, viz. *affinis* (Dallas), *deyrollei* Spinola, *distinctus* (Montandon), *immarginatus* and *rubromarginatus*. Gross (*op. cit.*) examined the type material of the first four and a series of specimens of the fifth, and on this basis considered *affinis*, *deyrollei* and *distinctus* to be junior synonyms of *rubromarginata*. Gross (*op. cit.*) also described and illustrated the male genitalia (pygophore, paramere and partly inflated aedeagus) of *rubromarginata*, compared it with *D. deyrollei*, found no difference and therefore suggested that both represented the subspecies of *D. rubromarginatus*. The former (*D. rubromarginata rubromarginata sensu stricto*) was considered to be the low altitude eastern and southern Australian subspecies).

In this paper *D. rubromarginata deyrollei* is considered to be a junior synonym of *D. rubromarginata rubromarginata*. In addition to *D. rubromarginata* and *D. immarginata*, two new species *D. grossi* and *D. minuta* are described with reference to metathoracic scent complex and male and female genitalia. A key to the four species is given and a cladistic analysis is presented. Dissection and inflation of the male genitalia utilised the technique of Ahmad (1986). For the dissection of the female genitalia, illustrations, and measurements, conventional procedures, especially those used by the present authors (1981), were generally followed. All the measurements are in millimetres.

## Genus *Diemenia* Spinola

*Diemenia* Spinola, 1850, p. 35; Gross, 1976, p. 356.

Type-species: *D. rubromarginata* (Guérin-Méneville) (by monotypy)

### Description

**Coloration:** Generally body dark brown or black with ochraceous patches.

**Head:** Distinctly broader than long; paraclypeus much longer than clypeus but never enclosing the latter, produced into lobe-like structure just above the eyes; antecular distance distinctly longer than remainder of head; antenniferous tubercles produced anteriorly into spine-like process; antennae with basal segment longer than head apex, 2nd segment much longer than 3rd; labium reaching to hind coxae.

**Thorax:** Pronotum distinctly more than 2x broader than long, humeral angles prominent, lateral margins serrate; mesosternum sulcate; metathoracic scent gland ostiolar peritreme lobe-like, evaporating area rugulose; scutellum longer than broad, triangular; hemelytra with lateral margins sinuate.

**Abdomen:** Connexiva completely exposed at repose, sometimes tergal sclerites also exposed; 3rd and 4th abdominal venter with rugose vittae.

**Male genitalia:** Pygophore quadrangular, lateral lobes remarkably long; paramere Y-shaped; aedeagus with pair of many lobed dorsal membranous conjunctival appendage, penial lobes short, about equal to length of vesica.

**Female genitalia:** First gonocoxae triangular; 9th paratergites lobe-like and shorter than fused eighth paratergites; praetiger with posterior margin concave; spermathecal bulb with finger-like

processes, flanges distinct, pump region longer than bulb, proximal spermathecal duct much longer than distal spermathecal duct.

KEY TO THE SPECIES OF THE GENUS *DIEMENIA*

- 1 — Paraclypeal lobe in front of the eyes small; pygophore with bifurcated dorso-lateral lobes; inner lobe of blade of paramere with a single seta. . . . . *rubromarginata* (Guérin-Ménéville)
- Paraclypeal lobe in front of the eyes more prominent, pygophore with unilobed dorso-lateral lobes; inner lobe of blade of paramere without seta. . . . . 2
- 2 — Entire lateral margins of pronotum distinctly serrate; tergites not exposed at repose; dorso-lateral lobes of pygophore laterally not produced; spermathecal bulb with two-finger-like processes. . . . . *grossi* sp. nov.
- Only antero-lateral margins of pronotum serrate; tergites exposed at repose; dorso-lateral lobes of pygophore laterally produced; spermathecal bulb with three finger-like processes. . . . . 3
- 3 — Antecular distance slightly longer than remainder of head; 2nd labial segment shorter than 3rd; dorso-lateral lobes of pygophore beak-like. . . . . *immarginata* (Dallas)
- Antecular distance about  $1\frac{1}{2} \times$  length of remainder of head; 2nd labial segment longer than 3rd; dorso-lateral lobes of pygophore lobe-like. . . . . *minuta* sp. nov.

*Diemenia grossi* sp. nov.

(Figs. 1, 5, 9, 13, 17, 21, 25)

*Description*

*Coloration:* Body black, except lobe just above the eyes brown, thickly punctate; proximal  $\frac{1}{2}$  of 3rd and 4th antennal segments and anterolateral half of pronotum pale; a little anterobasal portion of corium, and each median connexival portion ochraceous; ocelli tinged reddish; eyes brownish black; membrane of hemelytra light brown. Total length of male = 10.2; female = 10.3.

*Head:* Antecular distance (1.1) slightly more than  $1\frac{1}{2} \times$  remainder of head (0.7); paraclypeal lobe just above the eyes more prominent with rounded tips; antenniferous tubercles large with sharply pointed tips; antennae with 2nd segment distinctly more than  $3 \times$  length of basal segment, length of segments I 0.8 (0.8–0.85), II 2.7 (2.7–2.95), III 1.6, IV 1.7 (1.5–1.7) labium with 4th segment

longer than basal and slightly shorter than 3rd, length of segments, I 0.7 (0.7–0.8) II 1.1 (1.1–1.15), III 1.0 (1.0–1.1), IV 0.9; head width 2.65 (2.6–2.65); interocular distance 1.6; interocellar distance 0.6 (0.6–0.7).

*Thorax:* Pronotal width 5.0 (4.9–5.0) distinctly more than  $2\frac{1}{2} \times$  its length 1.9 (1.7–1.9), entire lateral margins distinctly serrate, anterior angle spinose and not reaching  $\frac{1}{2}$  length of eyes, humeral angle acute, (4.9–5.0); scutellum (length 3.5, 3.3–4.5; width 2.9, 2.9–3.0) with distinct apical lobe, metathoracic scent gland ostiolar peritreme (Fig. 5) lobe-like, apex acuminate, anteriorly directed; length base scutellum-apex clavus 2.7 (2.6–2.7); apex clavus-apex corium 2.3 (1.9–2.3); apex corium-apex abdomen including membrane 1.5 (1.5–2.0); apex scutellum-apex abdomen including membrane 3.0 (3.0–3.5).

*Abdomen:* Postero-lateral margin of 7th abdominal sternum sinuate; entire connexiva exposed at repose.

*Male genitalia:* Pygophore (Fig. 9) as long as broad, lateral lobe narrowed, elongate, inwardly directed, postero-dorsal margin medially convex; posteroventral margin medially shallowly concave; paramere (Fig. 13) with inner margin of inner lobe of blade convex, apex narrowed; aedeagus (Fig. 17) with dorsal membranous conjunctival appendage bilobed at base, each lobe formed by four-lobed structure, with pair of ventrolateral thecal appendages, vesica short, slightly shorter than penial plates.

*Female genitalia* (Fig. 21): First gonocoxae large, plate-like, somewhat triangular, medially close to each other; 2nd gonocoxae convex; 9th paratergites narrowed, lobe-like; posterior margins of fused 8th paratergites medially inpushed; spermatheca (Fig. 25) with margins of pump region distinctly sinuate, spermathecal bulb with two finger-like processes.

*Material examined*

Holotype male, New England National Park via Ebor, N.S.W. 22,23–1–1966, B. Cantrell, in Queensland Museum, Brisbane (Reg. No. T. 11, 107). Paratype: 1 female, Green Hill Estate, Foot hills, savannah form Ra. S.A. 24–8–1958, Under bark Mt Lofty, T.E. Woodward, in Department of Entomology, University of Queensland, Brisbane.

*Comparative note*

*Diemenia grossi* sp. nov. is most closely related to *immarginata* (Dallas) and *minuta* sp. nov. in having paraclypeal lobe just above the eyes prominent, and inner lobe of blade of paramere without seta but it can easily be separated from both by having entire lateral margin of pronotum distinctly denticulate, spermathecal bulb with two-finger-like processes and by other characters as noted in the key and description.

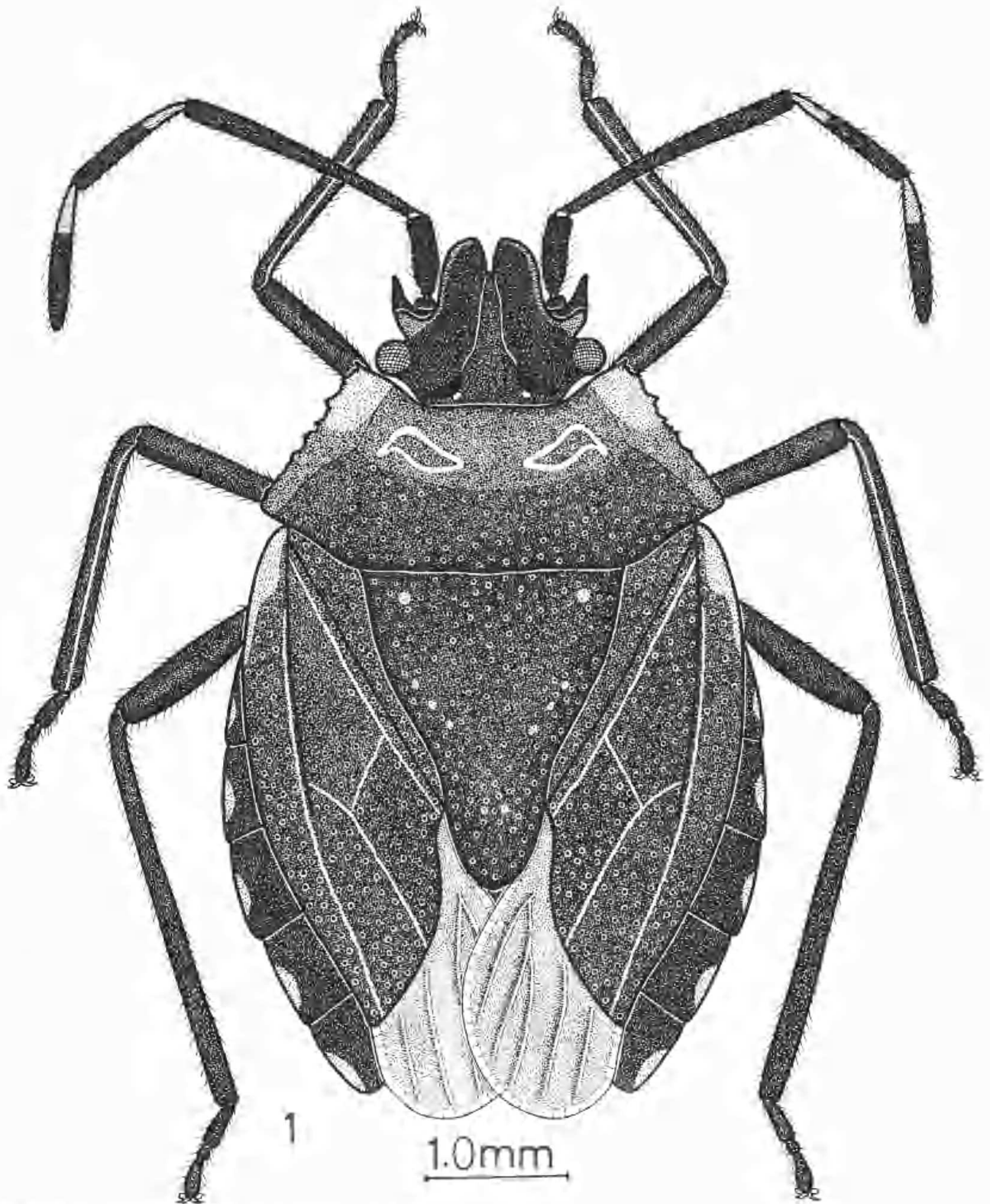


FIGURE 1. *Diemenia grossi*, male, dorsal view.

*Diemenia immarginata* (Dallas)  
(Figs 2, 6, 10, 14, 18, 22, 26)

*Platycoris immarginatus* Dallas, 1851, p. 1.  
*Diemenia immarginata* Gross, 1976, p. 363.

*Description*

*Coloration and measurements:* Body blackish brown, thickly punctate except narrow lateral margin of paraclypei, antennae with little basal portion of basal and 3rd segment, anterolateral margin of pronotum, scutellum with basal spot at

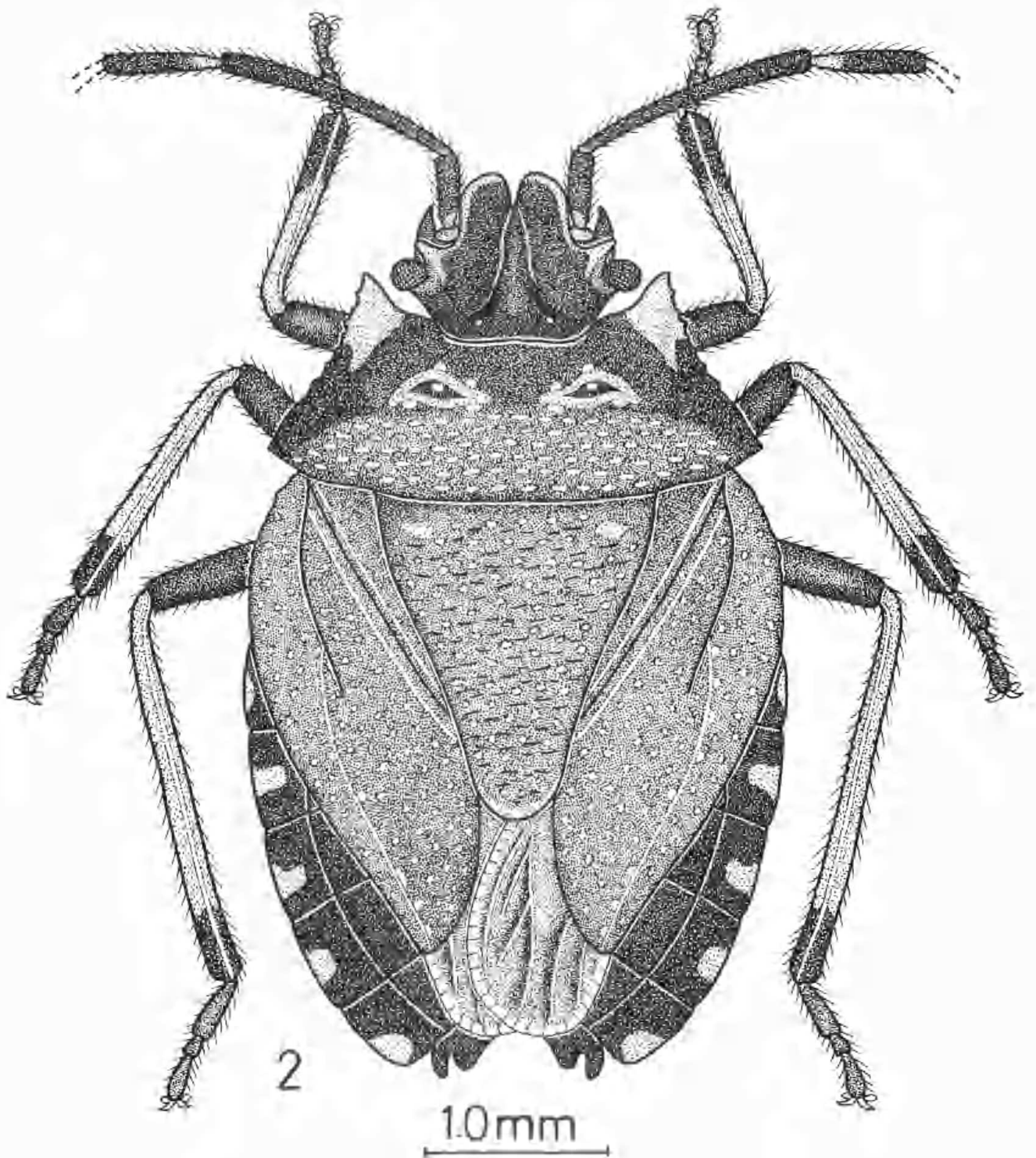


FIGURE 2. *Diemenia immarginata*, male, dorsal view.

each angle and apical little margin, about basal  $\frac{3}{5}$  portion of each tibiae and median little portion of each connexival joints light brown; ocelli brown; eyes brownish black; membrane of hemelytra brown. Total length of male = 9.0; female = 10.3.

*Head*: Anteoocular distance 0.9 (0.8–0.9) slightly more than remainder of head 0.8 (0.65–0.8); paraclypeal lobe just above the eyes prominent with

rounded tips; antenniferous tubercles large with sharply pointed tips; antennae with 2nd segment about 3× length of basal segment, length of segments, I 0.8 (0.7–0.8), II 2.3 (2.1–2.3), III 1.3 (1.2–1.3), IV mutilated; labium with 4th segment slightly longer than basal and distinctly shorter than 3rd, length of segments, I 0.7 (0.6–0.7), II 0.9, III 1.1 (1.0–1.1), IV 0.8 (0.7–0.8); head width 1.95

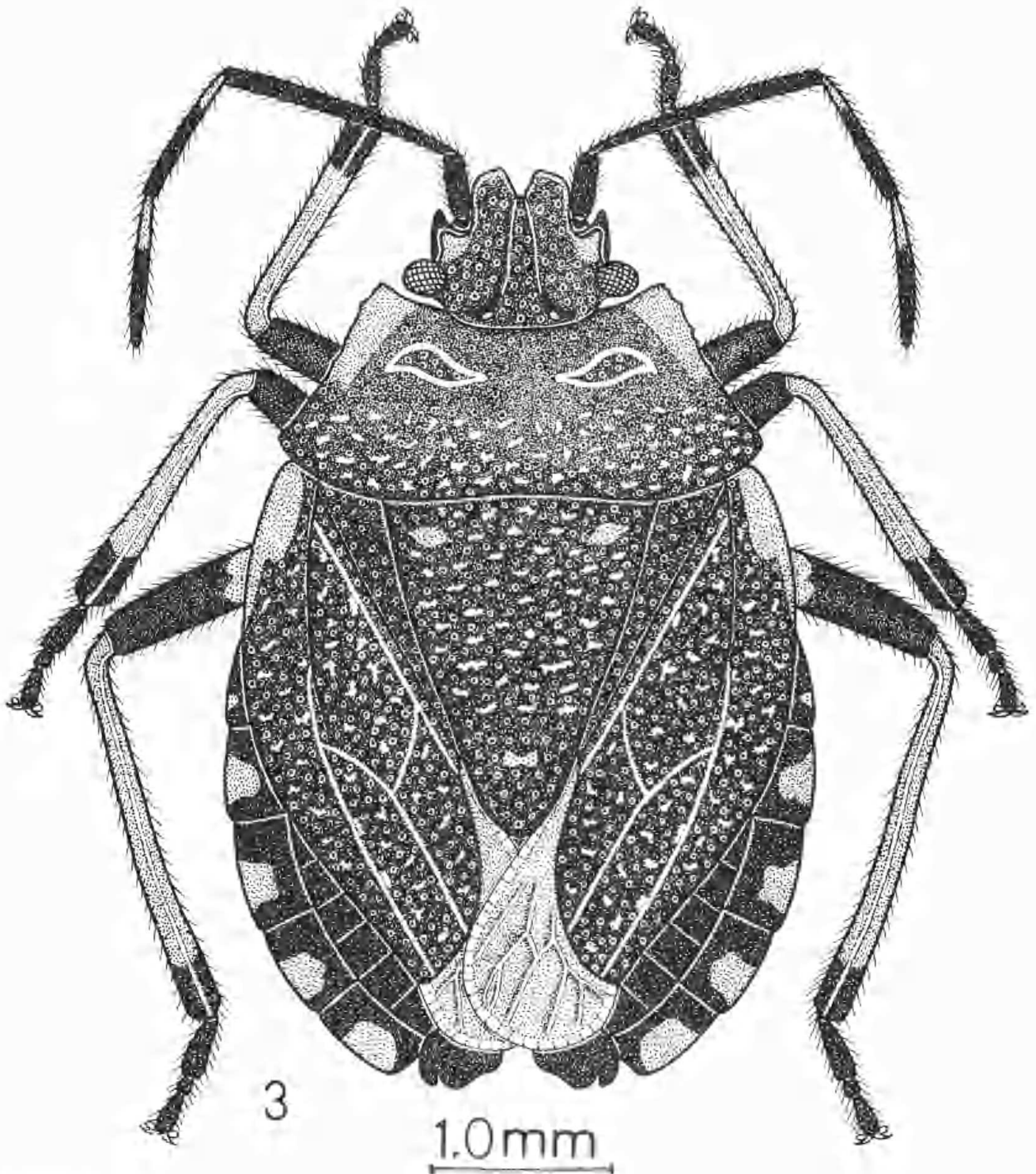


FIGURE 3. *Diemena minuta*, male dorsal view.

(1.95–2.15); interocular distance 1.6 (1.4–1.6); interocellar distance 0.65.

**Thorax:** Pronotal width 4.6 (4.4–4.6) distinctly more than  $2\frac{1}{2} \times$  its length 2.7 (2.65–2.7), anterolateral margin of pronotum dentate, anterior angle produced and passing more than  $\frac{1}{2}$  length of eye, humeral angles acute; scutellum (length 3.2, 2.85–3.2; width 2.7, 2.65–2.7) with less distinct apical lobe; metathoracic scent gland ostiolar

peritreme (Fig. 6) lobe-like apex round and anterolaterally directed; length base scutellum–apex clavus 2.4 (2.2–2.4); apex clavus–apex corium 2.1 (1.8–2.1); apex corium–apex abdomen including membrane 1.1 (1.1–1.8); apex scutellum–apex abdomen including membrane 2.5 (2.5–2.8).

**Abdomen:** Postero-lateral margin of 7th abdominal sternum sinuate, entire connexiva and last three tergal segments exposed at repose.

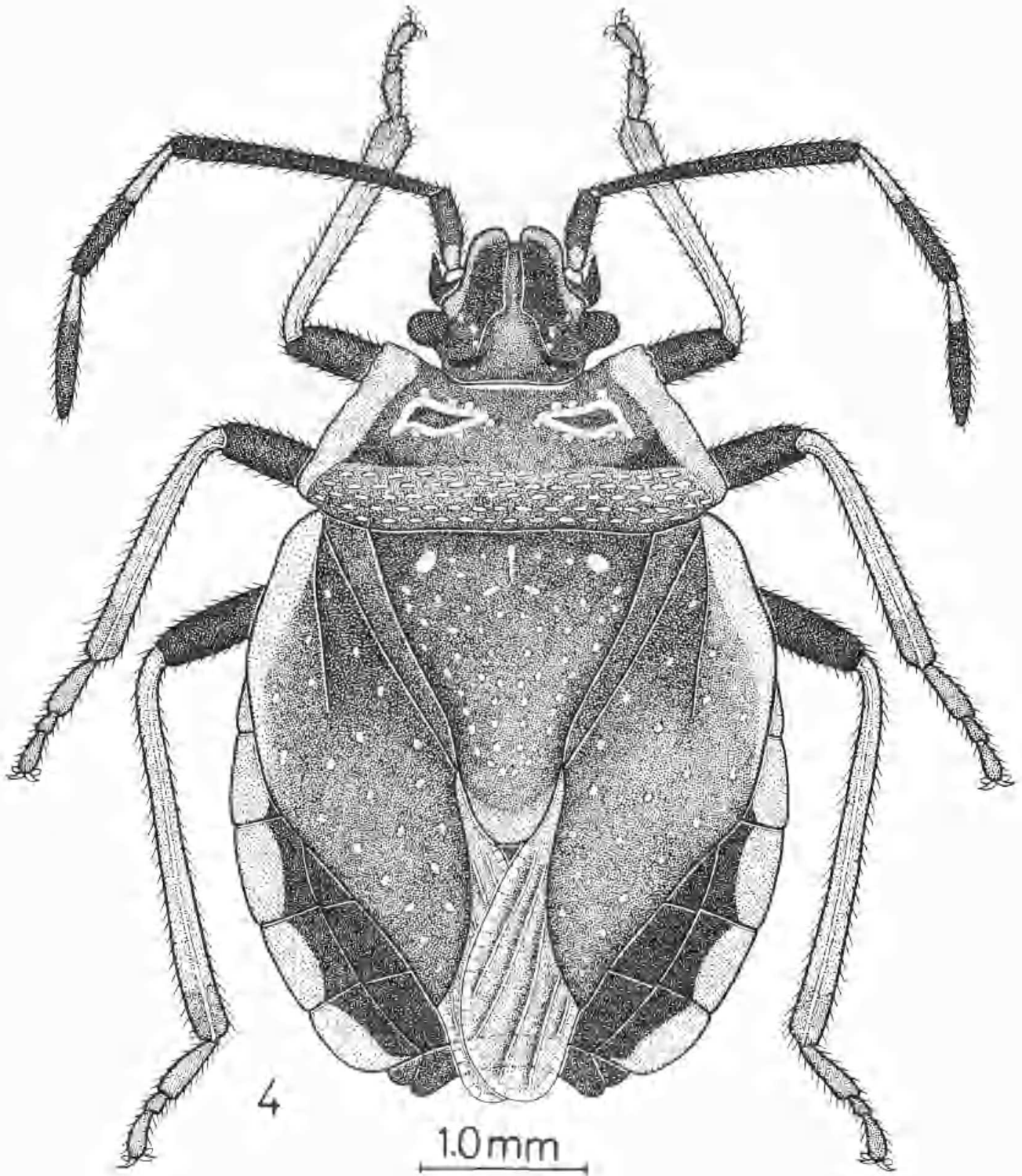
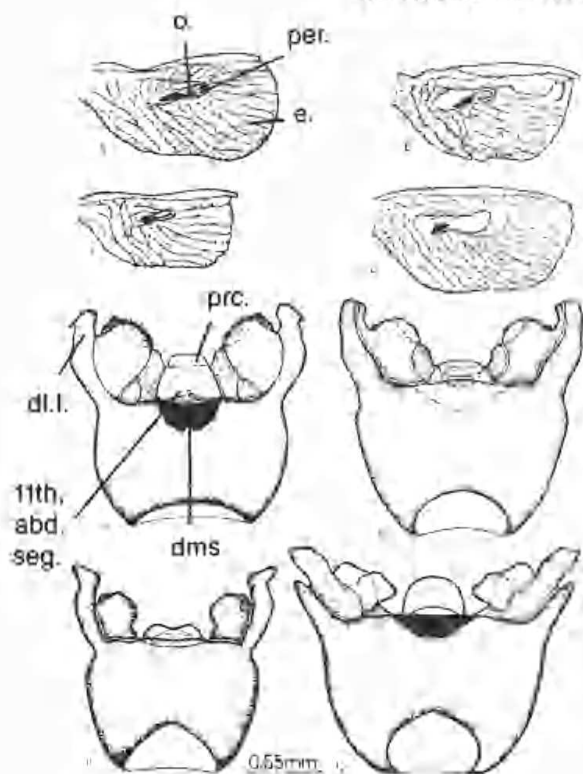


FIGURE 4. *Diemenia rubromarginata*, male, dorsal view.

*Male genitalia:* Pygophore (Fig. 10) slightly broader than long, lateral lobe narrowed, beak-shaped, outwardly directed, posterio-dorsal margin sinuate; paramere (Fig. 14) with inner margin of the inner lobe of blade convex, apex narrowed; aedeagus (Fig. 18) with dorsal membranous conjunctival appendage bilobed at base, each lobe

lateral thecal appendages, vesica short, slightly shorter than penial plates.

*Female genitalia* (Fig. 22): First gonocoxae large, plate-like, somewhat triangular, medially close to each other; 2nd gonocoxae concave; 9th paratergites broad, lobe-like; posterior margins of fused 8th paratergites medially slightly concave; spermatheca (Fig. 26) with margins of pump region slightly



FIGURES 5-12. *Diemenia* species: 5-8, metathoracic scent gland ostioles, ventral view; 5, *grossi*, 6, *immarginata*, 7, *minuta*, 8, *rubromarginata*; 9-12, pygophore, dorsal view, 9, *grossi*, 10, *immarginata*, 11, *minuta*, 12, *rubromarginata*. 11th. abd. seg. (Eleventh abdominal segment); dl.l. (dorso-lateral lobe); dms (dorso-median surface); e. (evaporatoria); o. (ostiole); per. (peritreme); prc. (proctiger).

sinuate, spermathecal bulb with three finger-like processes.

#### Material examined

1 male, Burnie Tas. Lea. det. G.F. Gross 1987, 1 female, Mt Kosciusko. B. Ingleby. det. G.F. Gross 1987, in South Australian Museum, Adelaide.

#### Comparative note

*Diemenia immarginata* (Dallas) is most closely related to *minuta* sp. nov. in having only anterolateral margins of pronotum denticulate, tergites exposed at repose and spermathecal bulb with three finger-like processes but it can easily be separated from the same by having anteocular distance only slightly longer than remainder of head and lateral lobes of pygophore pointed into a beak-like structure and by other characters as noted in the key and description.

***Diemenia minuta* sp. nov.**  
(Figs. 3, 7, 11, 15, 19, 23, 27)

#### Description

**Coloration and measurements:** Body ochraceous black, thickly punctate; except narrow lateral

margins of paraclypei, antennae with 1st and 2nd, of proximal  $\frac{1}{3}$  of 3rd and 4th segments, anterolateral margins of pronotum, a small spot at each basal angle and on apical lobe of scutellum, antero-lateral patch on corium, proximal  $\frac{1}{2}$  of femur, more than proximal  $\frac{1}{3}$  of portion of each tibia, median little portion of each connexival suture ochraceous; ocelli tinged red; eyes dark; membrane of hemelytra brown. Total length male = 8.30; female = 9.70.

**Head:** Anteocular distance 0.9 (0.9-0.95) about  $1\frac{1}{2} \times$  length remainder of head 0.6 (0.6-0.65); paraclypeal lobe just above eyes prominently developed with rounded tips; antenniferous tubercles moderate with blunt tips; antennae with 2nd segment equal or slightly longer than  $3 \times$  length of 1st segment, length of segments I 0.7, II 2.3 (2.1-2.3), III 1.4 (1.2-1.4), IV 1.5; labium with 4th segment equal to 1st and distinctly shorter than 3rd, length of segments, I 0.6 (0.6-0.75), II 1.05 (1.0-1.05), III 1.0, IV 0.6 (0.6-0.75); width head 2.2 (2.2-2.3); interocular distance (1.4, 1.4-1.5); interocellar distance 0.6.

**Thorax:** Width of pronotum 4.1 (4.1-4.35), about  $2\frac{1}{2} \times$  its length 1.6 (1.6-1.8); antero-lateral margin serrate, anterior angle blunt and not reaching  $\frac{1}{2}$  length of eyes, humeral angles acute; scutellum (length 2.8, 2.8-3.3; width 2.5, 2.5-2.9) with less distinct apical lobe; metathoracic scent gland ostiolar peritreme (Fig. 7) lobe-like, apex narrowed, anterolaterally directed; length base scutellum-apex clavus 2.2 (2.2-2.6); apex clavus-apex corium 1.9 (1.9-2.1); apex corium-apex abdomen including membrane 0.8 (0.8-1.6); apex scutellum-apex abdomen including membrane 2.4 (2.4-3.0).

**Abdomen:** Postero-lateral margin of 7th abdominal sternum sinuate; entire connexiva and last three tergal segments exposed at repose.

**Male genitalia:** Pygophore (Fig. 11) as long as broad, lateral lobe narrowed, elongate, outwardly directed, postero-dorsal margin medially sinuate, postero-ventral margin medially shallowly concave; paramere (Fig. 15) with inner margin of inner lobe of blade convex, apex narrowed and acuminate; aedeagus (Fig. 19) with dorsal membranous conjunctival appendage bilobed at base, each lobe formed by trilobed structure, with pair of ventrolateral thecal appendages, vesica short, slightly shorter than penial plates.

**Female genitalia** (Fig. 23): First gonocoxae large, plate-like, somewhat triangular, medially close to each other; 2nd gonocoxae straight; 9th paratergites broad, lobe-like; posterior margins of fused 8th paratergites medially slightly concave; spermatheca (Fig. 27) with margins of pump region medially notched, spermathecal bulb with three finger-like processes.

*Material examined*

Holotype male, Mt Buffalo National Park, east Victoria, 17-1-1966, B. Cantrell, in Queensland Museum, Brisbane (Reg. No. T.11, 106). Paratype; 1 female, Mt Hotham, east Victoria 16-1-1966, T. Weir, Department of Entomology, University of Queensland, Brisbane.

*Comparative note*

*Diamenia minuta* sp. nov. is most closely related to *D. immarginata* (Dallas) as noted under the comparative note of that species, but it can easily be separated from the same by having 2nd labial segment longer than 3rd as compared to 2nd labial segment shorter than 3rd in *D. immarginata* and by other characters as noted in the key and description.

*Diamenia rubromarginata* (Guérin-Ménéville)

(Figs. 4, 8, 12, 16, 20, 24, 28)

*Platycoris rubromarginatus* Guérin-Ménéville, 1830, p. 169.

*Diemenia rubromarginata* Gross, 1976, p. 366.

*Platycoris distinctus* Montandon, 1903, p. 286.

*Platycoris affinis* Dallas, 1851, p. 154.

*Diemenia deyrollei* Spinola, 1850, p. 91.

*Diemenia rubromarginata deyrollei* Spinola (*sic* Signoret) 1850, Gross, 1976, p. 366.

*Description*

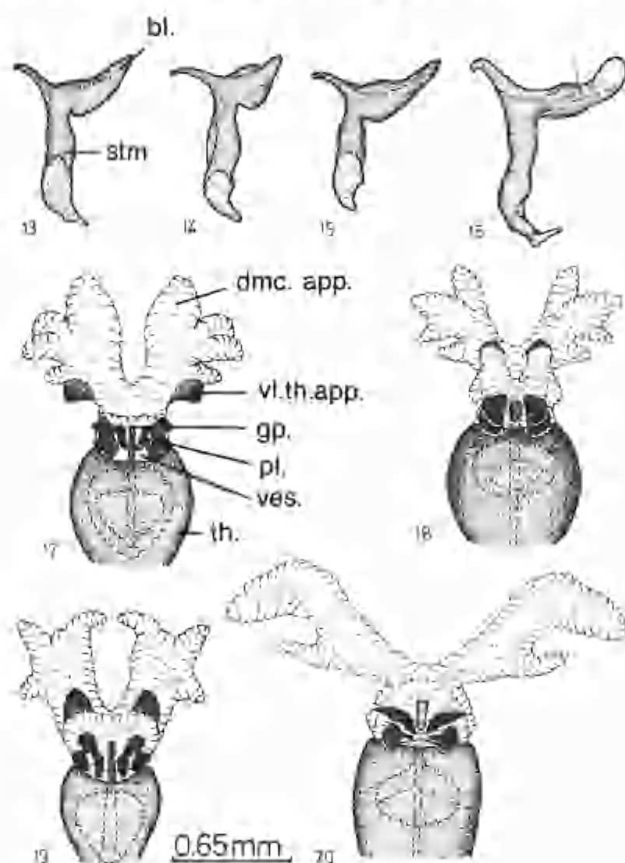
*Coloration and measurements:* Body dark brown, thickly punctate, except narrow lateral margin of paraclypeus, antennae with small basal arch of 1st proximal 1/3 of 4th and 5th, entire lateral margins of pronotum, one spot at each basal angle of scutellum, proximal half of lateral margin of corium, tibia excluding small distal part, lateral connexival sutures pale; little distal portion of tibia and all tarsi light brown; ocelli tinged reddish; eyes dark brown; membrane of hemelytra brown. Total length male 9.9 (9.15-10.0); female 9.6 (9.4-9.6).

*Head:* Anteocular distance 0.9 (0.85-0.9) slightly longer than remainder of head 0.8 (0.7-0.8); paraclypeal lobe just above the eyes poorly developed with rounded tips; antenniferous tubercles large with sharply pointed tips; antennae with 2nd segment more than 3x length of basal segment; length of segments, I 0.9, II 2.9 (2.9-3.0), III 1.4 (1.4-1.6), IV 1.5; labium with 4th segment distinctly shorter than basal and slightly shorter than 3rd, length of segments, I 1.1, II 1.2, III 1.0, IV 0.9; head width 2.5 (2.35-2.5); interocular distance 1.5 (1.35-1.55), interocellar distance 0.7 (0.7-0.75).

*Thorax:* Width of pronotum 4.6 (4.3-4.8) distinctly more than 2 1/2 x its length 1.6 (1.5-2.9); antero-lateral margin serrate, anterior angles acute and much shorter than 1/2 length of the eyes, humeral angles sub-rounded, scutellum (length 3.1, 2.9-3.3; width 3.0, 2.7-3.0) with distinct apical lobe; metathoracic scent gland ostiolar peritreme (Fig. 8) elongate, spatulate, apex narrowed, anteriorly directed; length base scutellum-apex clavus 2.4 (2.0-2.5); apex clavus-apex corium 2.5 (2.1-2.6); apex corium-apex abdomen including membrane 1.6 (1.4-1.9); apex scutellum-apex abdomen including membrane 3.2 (3.0-3.2).

*Abdomen:* Postero-lateral margin of 7th abdominal sternum somewhat straight; entire connexiva and last three abdominal terga exposed at repose.

*Male genitalia:* Pygophore (Fig. 12) much broader than long, lateral lobes narrowed at apex and shorter, postero-dorsal margin medially slightly convex, posteroventral margin deeply concave; paramere (Fig. 16) with inner margin of inner lobe of blade sinuate, apex broad, outer lobe curved



FIGURES 13-20. Parameres, inner view, 13, *grossi*, 14, *immarginata*, 15, *minuta*, 16, *rubromarginata*; 17-20, aedeagus, dorsal view, 17, *grossi*, 18, *immarginata*, 19, *minuta*, 20, *rubromarginata*. bl. (blade); dmc. app. (dorsal membranous conjunctival appendage); gp. (gonopore); pl. (penial lobe); stm (stem); th. (theca); ves. (vesica); vl. th. app. (ventro-lateral thecal appendage).



inward, beak-like; aedeagus (Fig. 20) with dorsal membranous conjunctival appendage bilobed at base, each lobe formed by bilobed structure, with pair of ventral thecal appendages, vesica short, about equal to length of penial plates.

**Female genitalia** (Fig. 24): First gonocoxae large, plate-like, somewhat triangular, medially wide apart; 2nd gonocoxae concave; 9th paratergites narrowed, lobe-like; posterior margins of fused 8th paratergites medially inpushed; spermatheca (Fig. 28) with margins of pump region slightly sinuate, spermathecal bulb with three finger-like processes.

#### Material examined

1 male, 1 female South Australia, Horsnells Gully, Lower Hermitage, 17.10.1891, 14-18-5-1966, J.W. Mellor, J. Herridge, det. G.F. Gross 1987; 1 male, 1 female Hobart, Tasmania — J.J. Walker collection, in British Museum (Natural History), London; 1 female, Jasmann Loan No. HE 702/84, in Zoological Museum Helsinki, Finland.

#### Comparative note

*Diemenia rubromarginata* (Guérin-Méneville) resembles most *D. immarginata* (Dallas) in having antenniferous tubercles remarkably developed and spine-like and paraclypei much longer than clypeus, but it can easily be separated from all the *Diemenia* species by having paraclypeal lobe just above the eyes less prominent and inner lobe of the blade of paramere with a single seta, and by other characters as noted in the key and description.

#### CLADISTIC ANALYSIS OF THE INCLUDED TAXA

Ahmad & Kamaluddin (1989) have presented a cladogram of some genera of the *Diemenia* group of Gross (1976) including *Diemenia* and *Niarus*. Here a cladistic analysis of *Diemenia* species is given based upon 14 characters. Polarity was determined on the basis of out-group comparison with the members of the superfamily Pentatomoidea and Trichophora. No homoplasy had to be invoked.

#### Character and Character States

1. *Lunate patch above ocelli* (a): Ahmad & Kamaluddin (1989) examined representatives of a number of genera of the *Diemenia* group of Gross (1976) and considered it apomorphic. It is a unique condition in the entire Family Pentatomidae and is only found in *Diemenia* and *Niarus* species and therefore is considered here to be their synapomorphy.

2. *Lateral lobes of paraclypei just above the eyes* (b): Ahmad & Kamaluddin (1989) found this condition in those of several genera of the *Diemenia* group and have considered it apomorphic.

Following their reasoning in *grossi*, *immarginata* and *minuta* the condition of more prominent lateral lobes is considered here to be a further derived state ( $b_2$ ).

3. *Anterior lobes of pronotum produced and directed anterior* (c): It is a rare condition and is noticed in some tetrodines of Phyllocephalinae and Ahmad & Kamaluddin (1988b) have considered it to be apomorphic. Following their reasoning this character state in *immarginata* and *minuta* also reflects their synapomorphy. In *immarginata* the apex of anterior lobes appears narrower and more prominent and probably reflects a more derived state ( $c_2$  in Fig. 29).

4. *Lateral margins of pronotum crenulate* (d): In halyines and some asopines a portion of the lateral margin of pronotum is crenulate like those of lestonocorines which state was considered to be apomorphic by Schaefer & Ahmad (1987). In *Diemenia* and *Niarus* species also this character state looks apomorphic (d). On the other hand the entire lateral margin showing marked crenulations in *grossi* looks to be a more derived state ( $d_2$  in Fig. 29).

5. *Patch on the apical lobe of scutellum* (e): In several groups of Pentatominae including those of *Diemenia* species there is usually a spot on each basal angle of the scutellum but the spot on the apical lobe of the scutellum is very rare and it is certainly apomorphic in *minuta*.

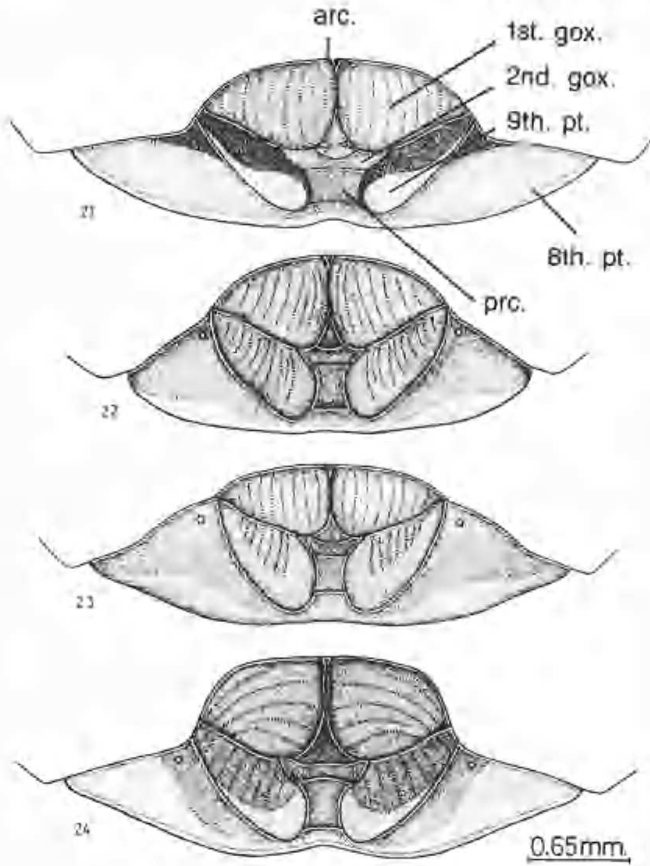
6. *Tibiae sulcate* (f): Sulcated tibiae are encountered in some groups of Trichophora as in coreines and was considered derived by Ahmad (1979). The sulcated tibiae in *Diemenia* species are also considered here to be their autapomorphy.

7. *Tibiae flattened* (g): This character is also remarkably rare in Trichophora as is the case in some coreine Trichophora and it also appears to be an autapomorphy of *Niarus* species.

8. *Sides of abdomen exposed* (h): In most of the Pentatominae only a small portion of connexiva is exposed but in *Diemenia* species not only the entire connexiva are exposed but the sides of the abdomen are also in some cases exposed. This is certainly autapomorphy of the group.

9. *Dorsolateral lobes of pygophore remarkably prominent* (i): This appears a rare character in Pentatominae. Ahmad & Kamaluddin (1989) also considered it apomorphic in certain genera of the *Diemenia* group. Laterally directed tips of these lobes appear more derived in *immarginata* and *minuta* ( $i_2$ ). In *minuta* however the laterally directed portion is remarkably prominent and this state appears to be further derived ( $i_3$  in Fig. 29).

10. *Outer margin of paramere with an arch-shaped tooth-like structure* (j): This is a rare condition in Pentatominae and Ahmad & Kamaluddin (1989)



FIGURES 21-24. Female terminalia, ventral view, 21, *grossi*, 22, *immarginata*, 23, *minuta*, 24, *rubromarginata*. 1st gox. (first gonocoxae); 2nd. gox. (second gonocoxae); 8th. pt. (eighth paratergite); 9th. pt. (ninth paratergite); arc. (arcus); prc. (proctiger),

also considered it synapomorphy of some genera of the *Diemenia* group. In *immarginata* this lobe appears slender, more elongate and acute at the apex and reflects a more derived state ( $j_2$  in Fig. 29). In *rubromarginata* however the apex of the outer lobe is recurved which looks to be a further derived condition ( $j_3$  in Fig. 29).

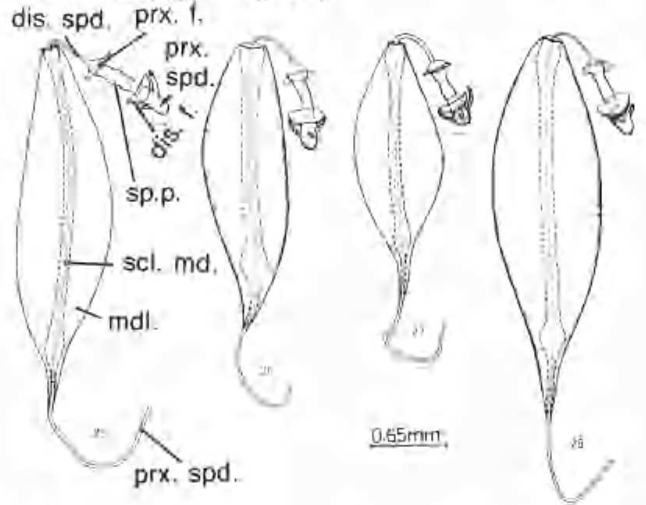
11. *Base of inner lobe of paramere with a bristle* (k): This is an extremely rare condition in Pentatominae and is only found in *D. rubromarginata* which is considered here to be its autapomorphy.

12. *Dorsal membranous conjunctival appendage multilobed* (l): In most of the Pentatominae the dorsal membranous conjunctival appendage is bilobed (Ahmad 1979). In *rubromarginata* each lobe is divided into two lobules which is certainly a derived state in this species. In *grossi*, *immarginata* and *minuta* each lobe is divided into several lobules which appears to be a further derived condition ( $l_2$  in Fig. 29).

13. *Ovipositor partly concealed by 1st gonocoxae* (m): In Pyrrhocoroidea, Ahmad & Schaefer (in manuscript) have considered partly concealed external genitalia to be an apomorphic state because it is very rare in Trichophora. Following their

reasoning in *Niarus* species the ovipositor partly concealed by the first gonocoxae is considered here to be an autapomorphy of the group.

14. *Spermathecal bulb with finger-like processes* (n): In some groups of Pentatominae the spermathecal bulb possesses finger-like processes which were considered to be apomorphic by Ahmad & Kamaluddin (1989). Following their argument, possession of three processes in most of the *Diemenia* species (one or two processes in *Niarus* species) is considered here to be a more derived condition ( $n_2$  in Fig. 29).



FIGURES 25-28. Spermatheca, 25, *grossi*, 26, *immarginata*, 27, *minuta*, 28, *rubromarginata*. dis. f. (distal flange); dis. spd. (distal spermathecal duct); mdl. (median dilation); pr. spb. (process of spermathecal bulb); prx. f. (proximal flange); prx. spd. (proximal spermathecal duct); scl. md. (sclerotized median duct); spb. (spermathecal bulb); sp.p. (spermathecal pump).

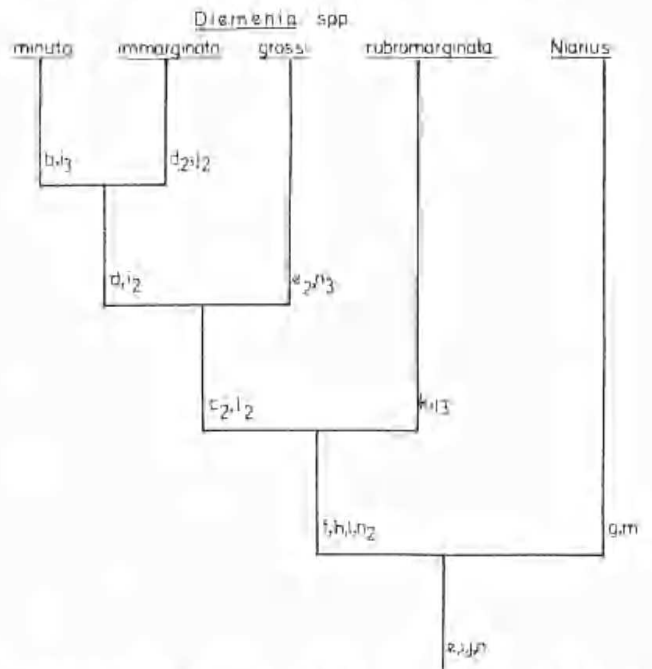


FIGURE 29. Cladogram of relationships between species of *Diemenia*.

### Discussion of Cladogram

Ahmad & Kamaluddin (1989) also considered *Niarius* and *Diemenia* species to be sister groups. *D. rubromarginata* appears isolated among the *Diemenia* species in having sister group relationship with *grossi*, *immarginata* and *minuta*. On the other hand *minuta* and *marginata* appear most closely related, and *grossi* to be their sister group. The anteriorly directed anterior lobes of the pronotum and laterally directed dorsolateral lobes of the

pygophore suggest that the two species are most closely related, and the complex multilobed dorsal membranous conjunctival appendages and more prominent lateral lobes of the paraclypei above the eyes, confirm the sister group relationship of *grossi* with *immarginata* and *minuta*.

### ACKNOWLEDGMENT

This project was financially supported by USDA/PARC Research Project No. FG-Pa-361(PK-SEA-155).

### REFERENCES

- AHMAD, I. 1979. A revision of the superfamilies Coreoidea and Pentatomoidea (Heteroptera: Pentatomomorpha) from Pakistan, Azad Kashmir and Bangladesh. *Ent. Soc. Kar. Suppl.* 1 (4): 1-113.
- AHMAD, I. 1986. A fool-proof technique for inflation of male genitalia in Hemiptera (Insecta) Pakistan. *J. ent. Soc. Kar.* 1 (2): 111-112.
- AHMAD, I. & KAMALUDDIN, S. 1981. A new species of the genus *Catacanthus* Spinola (Heteroptera: Pentatomidae: Pentatominae) from the New Hebrides with morphological notes on two other Australasian species and their relationships. *Rec. S. Aust. Mus.* 18 (11): 227-233.
- AHMAD, I. & KAMALUDDIN, S. in press. A new tribe for phyllocephaline genera *Gellia* Stal and *Tetroda* Amyot et Serville (Hemiptera: Pentatomidae) and their revision. *Annot. zool. bot. Bratislava*.
- AHMAD, I. & KAMALUDDIN, S. 1989. A new genus and species of the *Diemenia* group (Hemiptera: Pentatomidae: Pentatominae) from Australia with cladistic analysis of some related genera. *Rec. S. Aust. Mus.* 23 (1): 33-38.
- GROSS, G.F. 1976. Plant-feeding and other bugs (Hemiptera) of South Australia. Heteroptera. Parts I-II. Government Printer, Adelaide.
- GUÉRIN-MÉNEVILLE, F.E. 1830. Crustacea, Arachnida and Insecta of the Voyage, See France (voyages and c.-Coquille) Voyage Autour du Monde . . . sur la Coquille, pendant, 1822-25, and c. *Zoologie* 2 (2): 9-302. Paris.
- KIRKALDY, G.W. 1909. 'Catalogue of the Hemiptera (Heteroptera) with Biological and Anatomical References, lists of Foodplants and Parasites, etc. Vol. 1 Cimicidae.' Felix Dames, Berlin.
- MONTANDON, A.L. 1903. Hemiptères aquatiques notes synonymiques et géographiques, descriptions d'espèces nouvelles. *Bull. Soc. Bucarest.* 12 (1-2): 97-121.
- SCHAEFFER, C.W., and AHMAD, I. 1987. A cladistic analysis of the genera of the Lestonocorini (Hemiptera: Pentatomidae: Pentatominae). *Proc. Entomol. Soc. Wash.* 89 (3): 444-447.
- SPINOLA, M. 1850. Tavola sinnotica dei generi spettanti alla classe degli insetti arthrognati Hemiptera Linn., Latr. *Rhyngato Fabr., Rhynchota Burm. Mem. Matem. Fis. Soc. Ital. Modena* 25: 64-100.